PAPERS

IN

MANUFACTURES.

MANUFACTURES.

The Thanks of the Society were given to the Rev. Mr. SWAYNE, for the following Communication relative to the Culture of Silk in England.

SIR,

I BEG leave to addreſs you once more, on the ſubject of Silk-worms; not that I have the reſult of much additional experience in breeding them, to offer you, but chiefly to prevent diſcouragement to the undertaking, which I think not unlikely to ariſe, from a circumſtance attending the ſucceſsful experiment of Mr. Bertezen, of which an account is given in the VIIIth Volume of theſe Tranſactions. It had gone abroad, and, I believe, was not diſcountenanced by Mr. Bertezen, that he was poſſeſſed of a very extraordinary and ſupe-

rior breed of worms, as well as a ſecret art of managing them: the former he refuſed to impart,* and likewiſe to diſcloſe the latter. The account in the VIIIth Volume, that he obtained the five pounds of ſilk, for which he claimed the Society's premium, from twelve thouſand worms, compared with the calculations of Miſs Rhodes, in a former volume, that thirty thouſand would be neceſſary to produce that quantity, ſeems to confirm the fact of his having a very ſuperior breed of worms. And as he has now, I preſume, left this country, and taken his breed and his ſecret with him, ſome will be ready to object that, if there be a doubt whether ſo ſuperior a breed would have ſucceeded in this climate, much leſs is there any probability that any inferior breeds, particularly ſuch very inferior ones, it will be taken for granted,

* A friend of mine applied to him for a few eggs, and offered him his price, but could not obtain a ſingle grain.

granted, as we are at preſent in poſſeſſion of, will be attended with ſucceſs.

The difference between Miſs Rhodes's calculation, and the ſtatement given by Mr. Bertezen's actual produce, is, in appearance, amazingly great; but perhaps it may be greater in appearance than in reality. As ſilk is ſold by troy weight, Mr. Bertezen's pound was probably no more than twelve ounces. Miſs Rhodes very evidently calculated by averdupoiſe weight: had Miſs Rhodes's been adjuſted by the former weight, the number of cocoons, for five pounds of ſilk, had been twenty-one thouſand ſix hundred. Still the difference is very conſiderable. Mrs. Williams, in her letter, (Vol. II. of theſe Tranſactions) has mentioned two hundred and forty-four cocoons producing nearly an ounce and a half: a calculation, by this rule, extended to five pounds troy weight, would give fourteen thouſand ſix hundred and forty. But Miſs Rhodes ſuppoſes that

Mrs. Williams includes the whole of the waſte ſilk, as well as that reeled off. I do not ſee any reaſon for ſuch a ſuppoſition. I laſt year bred fewer than one hundred worms (merely for the ſake of experiments, and continuing the breed), and ſuffered them all to perforate their cocoons. Only fifty of theſe could be wound off, which was done in the method deſcribed in a former letter. The reeled ſilk produced from theſe fifty cocoons, weighed exactly one hundred grains: if from this we calculate the number ſufficient for five pounds troy, we ſhall have fifteen thouſand five hundred and fifty. As theſe were wound off dry, ſo much of the ſilk could not be taken from them, as is generally done when reeled in hot water, where oftentimes nearly the whole of the ſilk is reeled. The ſilk which remained on thoſe fifty cocoons, after reeling, weighed thirty-three grains. If we only allow half of this weight to be added to that reeled off, it will reduce the number neceſſary for five pounds,

pounds, to thirteen thouſand four hundred and five. Here the difference, when compared with Mr. Bertezen's, is not very conſiderable.

But it is poſſible that Mr. Bertezen's ſilk might have been weighed by averdupoiſe weight; in which caſe I am inclined to think, as the round number twelve thouſand is given, that he might have calculated, without any actual enumeration, according to a rule mentioned in the pamphlet which he publiſhed on the ſubject of Silk-worms, by allowing one hundred and fifty cocoons, of the average weight of five grains, to produce one ounce of organzine, which, at ſixteen ounces to the pound, gives exactly twelve thouſand for five pounds. The paſſage which contains this rule, I beg leave to tranſcribe from Mr. Bertezen's book.—" Theſe cones," meaning thoſe which he obtained from worms bred in England, the year before he publiſhed his account, " weighed, after the ga-
" thering, ſix grains each: ſome weighed

" five, and the weakeſt four, though the " worms were not of the firſt claſs. It is " eaſy to calculate that, in order to have " one ounce of organzine from ſuch cones, " one with another, one hundred and fifty " may be ſufficient." In this account I do not underſtand the meaning of the expreſſion, *after the gathering*. On the firſt reading, it ſhould ſeem to mean immediately after the gathering or collecting them from the broom, heath, or other twigs they were ſpun in: but this cannot be the intention, as, in this caſe, with the cryſalids included, they muſt have weighed a vaſt deal more; neither can it mean after the cryſalids were killed and become dry, as, even in this caſe, they muſt have weighed conſiderably more, ſince the dried cryſalids, even of the common breeds, weigh on an average four grains: it muſt therefore mean the whole ſilk produced by the worm, without any inſect included in it; and, if this is the proper interpretation, the weight is very extraordinary indeed. In thoſe cocoons which I have

have examined, the reeling ſilk has, on an average, amounted to about two grains and a quarter from each: the dried cryſalis has weighed about double the reeling ſilk, and the reeling ſilk has been rather more than double the waſte ſilk.

Mr. Pullein, in his Eſſay on the Culture of Silk, which is by much the beſt treatiſe I have met with on the ſubject, and which I have but lately had an opportunity of conſulting, tells us, that "three thouſand "three hundred ſilk pods, with the cryſalids "in them (that is, alive or unbaked) weigh "about twelve pounds; theſe twelve "pounds will make about ſixteen ounces "of reeled ſilk, beſides about eight ounces "of flos." This gives of reeling ſilk to each cocoon two grains and one third. In a paper containing an account of the management of Silk-worms, publiſhed in the Second Volume of the American Philoſophical Tranſactions, communicated to Dr. Morgan of Philadelphia, from Meſſrs. Hare

and Skinner, of London, and ſaid to be obtained from one of the firſt houſes in Italy, we are told that one hundred and fifty ounces of good cocoons yield about eleven ounces of ſilk, from five or ſix cocoons: if you wind coarſer, ſomething more. This I calculate to give no more than two grains and one twentieth to each; whereas Mr. Bertezen's worms produced, on an average, three grains and one fiftieth, although the worms, he tells us, were not of the firſt claſs.

I have been told by a perſon who ſaw them, that Mr. Bertezen's worms and cocoons were amazingly large, and that he even ſhewed one cocoon very little inferior in ſize to a common hen's egg.

It is not however always the conſequence, that the larger the cocoon the more valuable; ſince we have it from reſpectable authority (the paper juſt mentioned in the American Philoſophical Tranſactions), that

" the

" the good cocoons are thoſe which are " brought to perfection ſtrong and little: " that the cocoons of the mountains are " better than thoſe of the plain; it is true " they are not ſo large as thoſe of the " plain, but the worm is proportionably " leſs." If therefore this extraordinary large breed is not to be come at, we ſurely ought to be contented with poſſeſſing, and the poſſibility of poſſeſſing ſuch breeds as we know will produce, in this country, as large a quantity of ſilk, as is, on an average, produced by ſilk-worms in the beſt ſilk country in Europe. There is likewiſe another reflexion, from which we may draw ſome conſolation, that, the larger the worm, the more food muſt it proportionably devour. With regard to the importation of foreign breeds, it is the opinion of Mr. Pullein, " that neither animals nor " plants, when tranſported from one cli- " mate to another of a different tempera- " ture, are immediately naturalized; that " there is ſome time required, and often

" ſome

" ſome ſucceſſion of generations, before " their nerves and fibres can adapt them- " ſelves to the different influence of the " air and ſun." The conſequence he draws from hence is, that it cannot be expected by us, that ſilk-worms, bred from eggs, imported recently from Italy or France, can immediately thrive: thoſe therefore who attempt the breeding of ſilk-worms in England, had better raiſe their ſtock from eggs, which have, from ſome preceding generations, had their originals among us. This opinion, it will be ſaid, Mr. Bertezen's very ſucceſsful experiment effectually contradicts: but Mr. Bertezen's experiment does not apply in this caſe, as, if I am not miſtaken, he made uſe of artificial heat.

As an inſtance to confirm the above reaſoning of Mr. Pullein, I might mention, that the worms produced from thoſe eggs you was kind enough to favour me with, obtained from Turin, proved much more tender and delicate than the breed I was before poſ-

ſeſſed

ſeſſed of; nor was the ſilk they ſpun, nearly ſo ſtrong as that ſpun by the latter. However, it is but juſt to ſay, that the Turin worms appeared to be a variety quite diſtinct from the others; their eggs, when firſt received, were ſmaller, and continue to be ſo in ſucceſſion: the worms are not ſo large, and have ſome peculiar marks on them. The cocoons they ſpun, were moſtly white, or fleſh-coloured, of a different. and irregular ſhape, ſome of them almoſt globular: the thread of the cocoon ſeemed ſmaller and more delicate, and was more firmly ſtuck together with the natural gluten, ſo that it could not be reeled off but in very hot water. One peculiarity attending the Turin worms, was, that they refuſed lettuce leaves, and choſe rather to die than to taſte them.

In a former letter I informed you, that I procured a quantity of mulberry ſeed, with an intention of raiſing a nurſery of young trees from it. This was ſown in the month

month of April, 1789; the largeſt part of it, and the beſt ſeed, on a bed of dung, which was intended for a ſlight hot-bed; but the dung being very ſtale, and having fermented before, did not heat at all, at leaſt not perceptibly: the remainder was ſown on a border, under a ſouth wall. The ſeed on the dung-bed vegetated rather earlier than the other, and grew very well during the ſummer, many of the plants riſing ſix inches in height. With a view to prevent the ill effects of the froſt, the bed was covered, at the approach of winter, with a coating of moſs, which had been immerſed in ſcalding water; this I thought neceſſary to kill the eggs and larva of inſects, as well as the ſeeds of weeds which it might contain: this precaution, however, with reſpect to froſt, was entirely uſeleſs, as the winter proved ſo exceedingly mild. In the ſpring, I counted upwards of three thouſand apparently healthy plants. In the latter part of the ſucceeding ſummer, they were attacked with a diſeaſe which

ſhewed

ſhewed itſelf in putrid ſpots on the leaves, which by degrees rotted off: on examining theſe plants, in the autumn, when about to tranſplant them, they were almoſt all of them found to be cankered off juſt at the ſurface of the ground. What was the cauſe of this diſorder, I cannot with certainty pronounce; but am inclined to impute it, jointly to the wetneſs of the ſeaſon, and the roots of the plants ſtriking into the dung: thoſe which were ſown on the common earth, in the ſouth border, were not ſo much affected by this diſeaſe; yet ſome of them were killed by it. The ſummer of 1789, as well as the laſt, was ſo unfavourable to the ripening of mulberries, that I could get no good ſeed. I ſtill hope that ſome effectual method will be found out, of raiſing them from cuttings; but, however that be, we may be aſſured that, as ſoon as there is a demand, mulberry-trees will be multiplied by ſome means or other. This is not barely my opinion, but the opinion of a perſon much better worth liſtening to.

" It

"It is demonſtrable," ſays the excellent Evelyn, "that mulberries, in four or five "years, may be made to ſpread all over "this land; and, when the indigent young "daughters, in proud families, are as "willing to gain three or four ſhillings a "day for gathering ſilk, and buſying "themſelves in this ſweet and eaſy em-"ployment, as ſome do to get four-pence "a day for hard work at hemp, flax, and "wool, the reputation of mulberries will "ſpread in England." The misfortune is, we are uncertain which kind of mulberry-trees, whether the white or the black, we ought particularly to attend to the propagation of; the ſentiments of writers on this ſubject, and the practice of the different ſilk countries, according to the accounts given us by travellers, are ſo exceedingly various. It is curious to compare a few of them. From Du Halde we gather, that the white mulberry is chiefly uſed in China: Mr. Swinburne tells us that, in Calabria, the red ſort, I ſuppoſe he means

means the black, is invariably the food they make uſe of; and that it is preferred by them to the white ſort for ſeveral reaſons which he mentions; although he informs us in the ſame page, that he believes it to be the effect of prejudice, as the Chineſe, Piedmonteſe, and Languedocians, prefer the white ſort. In his travels through Spain the ſame Author tells us, that, in Valencia, the trees are all of the white kind. In Grenada, where the beſt ſilk is produced, they are all black. Mr. Hanway, in his account of his travels in Perſia, mentions a ſhrub mulberry,* which, being annually pruned, produces the moſt proper leaves for the ſilk-worms: he does not ſay whether the mulberry-trees in that country were in general the black or the white fruited; yet he mentions being treated, on the 17th of May, with large white mulberries, at an entertainment, which, he ſays,

* Is not this the ſpecies of mulberry lately introduced into this kingdom by Mr. Nouaille?

ſays, are a delicious fruit, at Aſtrabad. From hence we are certain, that they have the white mulberry in Perſia. Mr. Pullein tell us, that the black-mulberry leaves are ſaid to be made uſe of in Perſia for rearing ſilk-worms; yet he ſeems rather inclined to prefer the white. Barham and Evelyn are decidedly for the white. Mr. Young writes me, that "it is very ſingular "that the black mulberries are never uſed, "I believe. I have ſeen noble trees of "that ſort, in Provence and in Piedmont, "but never ſtripped, having been planted "merely for the fruit: I made many in-"quiries, and was told, that the ſilk was "good for nothing. If the leaves would "do, thoſe trees would pay from one to "to two louis-d'or each per annum; yet "no uſe is made of them." Mr. Bertezen allows, "that, in Italy and France, "they make uſe of the white mulberry "leaf; deſpiſing the black ſo much, that, "in ſome parts, it is conſidered as poiſon "to ſilk-worms;" yet he aſſures us, "that

" that he himſelf by all means prefers the " black," and gives his reaſons for that preference: he adds, however, " that, in " well-regulated nurſeries abroad, on ac- " count of the advantages of the two " kinds of mulberry leaves, they are both " employed." Had not Mr. Bertezen given this information, I ſhould have imagined that it could ſeldom happen that both kinds ſhould be uſed in the ſame nurſery with advantage.

The black mulberry leaf is evidently much more ſucculent than the white; and therefore I ſhould be ready to conclude, that a change at any time, from the white to the black, would be very likely to cauſe the worms to burſt; chiefly from its containing more ſubſtance. I once gave my ſentiments in favour of the black mulberry leaf: ſince that time I have obſerved that the white has ſeemed more agreeable to the worms, and that they have ſeemed to thrive beſt with that food. In order to have the moſt agreeable and wholeſome food for the worms, it is, I

preſume, neceſſary, that the trees which produce that food, ſhould be in the moſt thriving ſtate: for the trees to flouriſh, they muſt grow in ſuch ſoil as is well ſuited to their nature: this congeniality of ſoil may be different, for the different kinds of mulberry. From what I have obſerved, the white ſeems to proſper in a moiſter and ſtiffer ſoil than the black would: it ſhould ſeem therefore, that we ſhould be directed in our choice of the ſort to be planted, by the ſoil we have to plant in. If our ſoil is dry, ſandy, or gravelly, we ſhould make choice of the black; if it be a rich loamy, and ſomewhat moiſt ſoil, we ſhould chooſe the white. A ſtiff clay, and a ſoil that is very wet, is unfit for either; but the ſureſt way would be to try both, and to multiply that ſort which throve beſt.

I am, SIR,

Your and the Society's obliged
humble ſervant,

G. SWAYNE.

Pucklechurch,
March 25, 1791.

Mr. MORE.

P.S.

P.S. Are there yet thoſe who object the unfitneſs of the climate to the ſcheme of raiſing ſilk in this country? What would they ſay, were they to read the under-written communication from a gentleman of credit, on the continent, to a celebrated agriculturiſt?

" Not leſs than five thouſand four hun-
" dred pounds weight of ſilk, has been
" raiſed laſt year (1789), in the cold,
" moſtly ſandy, territories of Pruſſia."
What could not be raiſed in the milder regions of Great-Britain and Ireland, under equal encouragement! a product which employs but ſix weeks of the agricultors and labourers work!

Mr. PHILIP JAMES KNIGHTS, of Norwich, having ſubmitted to the conſideration of the Society, a Shawl Counterpane, four yards ſquare, manufactured by him; which, on examination, appeared to be of greater breadth than any goods of equal fineneſs and texture, hitherto produced to the Society, or to their knowledge woven in this kingdom:

The SILVER MEDAL was preſented to Mr. KNIGHTS, as a token of the Society's approbation of his laudable attempt to improve the Manufactures of this Country.

SIR,

I TAKE the liberty to requeſt you will preſent the Counterpane, ſent herewith, to the Society for the Encouragement of Arts, Manufactures, and Commerce: it is made by Mr. Knights, of Norwich, in imitation of the Eaſt-India Shawl

Shawl Counterpanes, and is the firſt article of ſo fine a texture that ever was made of ſo large dimenſions, in this kingdom, being four yards ſquare, without any ſeam.

Mr. Knights is anxious to obtain the approbation of the Society, before he offers it for ſale. He has brought the manufacture to ſo great perfection in ſhawls, waiſtcoat ſhapes, &c. that they can hardly be diſtinguiſhed from Indian, though they can be afforded at one twentieth part of the price uſually given for the ſame articles that are brought from India. I underſtand, the largeſt articles ever attempted to be made in this country, prior to the one now preſented, are only one yard and a half wide.

I am, SIR,

Your humble ſervant,

JOHN HEMMING.

Bearbinder-Lane,
Oct. 22, 1791.

Mr. MORE.

SIR,

YOUR favour of the 21ſt inſt. is now before me, requeſting to be informed the price expected for the counterpane; and I find, on calculation, that it cannot be retailed at a lower price than twenty pounds, to be ſixteen quarters ſquare, as that is; and fifteen pounds, if twelve quarters, embroidered in the ſame manner: if plain, with a fringe only, it will come at eight guineas, ſixteen quarters; and ſix guineas, if twelve quarters ſquare, fringed. Pleaſe to obſerve, the middle being left plain, is intended for the coat of arms of the family, who may become the purchaſer, to be embroidered in, if they pleaſe, and at their own expence, by ſending down the drawing and ſize.

The Counterpane now preſented to the Society, for their inſpection, is the firſt ever completed, out of India, in a loom of that width, without a ſeam, and of that fineneſs and ſoftneſs of texture. It is equal in

in beauty, and far ſuperior in ſtrength, to the India Counterpanes, which are ſold ſo high as two hundred guineas. This manufacture improves every time it is waſhed; and the colours never ſtir by waſhing.

That the principal conſumption in this cloth, is in train-dreſſes for ladies wearing; as likewiſe for long ſcarfs, in imitation of the real India ſcarfs, which are ſold from ſixty to eighty pounds: whereas, ſcarfs of this fabric are ſold for as many ſhillings, and the ladies ſquare ſhawls in proportion.

I am, SIR,

Your moſt humble ſervant,

PHILIP JAMES KNIGHTS.

23 *Oct.* 1791.

Mr. MORE.